DEVELOPMENT OF AN AUTONOMOUS HIGH ALTITUDE BALLOON CUTDOWN SYSTEM

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ABSTRACT

Balloons are a simple and economical way to carry scientific instrumentation into the upper atmosphere and can provide a platform for atmospheric flight testing of prototype planetary mission instrumentation, reaching elevations up to and beyond 100,000 feet (30,000 m) on Earth. The University of Idaho Near Space Engineering program known as RISE (Research Involving Student Engineers) has now been launching balloons for seven years. Idaho RISE has a data acquisition system that measures atmospheric pressure and temperature as a function of altitude, and a redundant GPS tracking system that provides real time tracking of the balloon system through ascent, decent, and landing, allowing for a quick recovery of the descent package. A cutdown system has been developed by which payloads can be autonomously released based on timer, altitude, or if the balloon drifts outside of a preprogrammed latitude/longitude box. Working with NASA Ames Research Center, Idaho RISE is currently preparing for a flight of Snowflake, a miniature high-precision aerial delivery system developed by the Naval Postgraduate School and University of Alabama at Huntsville to evaluate advanced control, communication and command concepts for autonomously guided parafoil-payload systems. To date, Snowflake has been successfully deployed over 120 times from altitudes of up to 10,000 feet. The goal of the Idaho RISE Snowflake experiments is to provide a platform to deploy Snowflake at and above 30,000 feet and investigating its performance in these conditions. The launches with Idaho entail the 3rd stage of a proposed ISS sample return capability currently under development (SPQR- Small Payload Quick Return) at Ames Research Center.